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Dr. Francis Crick
Salk Institute for Biological Studies
San Diego, CA 92112

Dear Francis:

Many thanks for sending me your book, and thank you especially for the very friendly and generous mention of me in the Acknowledgments.

Your book affords a lucid account of the broad sweep of cosmology. You have done all of us a great service by writing it, for we are woefully behind in explaining such matters to the public. As a result of the deficiency in public understanding, a dreadful creature named Proxmire in the US Senate has singlehandedly stopped the search for extraterrestrial intelligence by NASA, and the congressional committees did nothing to thwart him. His action was a profoundly symbolic one, and I am sure that Chargaff would have applauded it, just as he objected to the landings on the moon.

Your text is studded with philosophical remarks that give rise to trains of thought. On p. 25, you have pointed out that the literati of our day are quite unresponsive to the grandeur of the universe. They are deaf to the "music of the spheres." Shakespeare could say:

There's not the smallest orb that thou beholds't
But in his motion like an angel sings,
Still quiring to the young-eyed Cherubins.

A century later, Addison wrote, "The spacious firmament." By then, the music had been stilled, the stars moved "in solemn silence," but the poet heard them singing "in reason's ear."

Today, all we have is Carl Sagan, saying that everything is "lovely."

We have done much better in photography than in poetry, and we must thank NASA. I have often reflected that the photographs of the Earth taken from the Apollo spacecraft were fully worth the entire expenditure on the space program, because of their effect on the thinking of people everywhere.

I have pondered on your remarks on eukaryotes. Several times, you have come back to yeast. For eukaryotes, you must have mitochondria, and these were prokaryotes. Carl Woese, speaks of urkaryotes, preceding the appearance of mitochondria.

I agree with the emphasis you have placed on the blue-green algae. When they colonized cells to form chloroplasts, they brought with them the genes for making the nutritionally essential amino acids, and some of the vitamins. Contrary to Pauling, these genes were not lost by animals during evolution, except for the one that makes vitamin C. The primitive heterotrophic cells from which eukaryotes have descended were never able to synthesize leucine, tryptophan, carotene.

On p. 129, you discuss whether bacteria would grow in the Urey-Miller soup. I am sure that this must have been done, because bacteria grow in far less nutritional surroundings, and molds grow practically anywhere.

I enjoyed Chapter Fifteen probably the best. As scientists, we have a great responsibility to prevent the promethean fire of reason from being extinguished. We are beleaguered by indifference, hostility and anti-intellectualism. Our old enemies, the creationists, are thriving in spite of their setback in Arkansas.

In your epilogue, you seem at first as if you want to send life elsewhere, but then, at the last, you draw back from this. I believe we should press ahead, before our impetus is lost. It is the recombinant DNA argument all over again.

There will be lots of opposition from the environmentalists, of course,

One question that you have left for the reader to answer is, why do we want to populate other planets, even with bacteria? I suppose the main reason is that we cannot bear the thought of a lifeless universe. Is this impulse selfish DNA at work again? Again, Shakespeare foresaw the ending that astronomers today predict for the Earth, and he wrote the lines from Prospero's speech, that are on Shakespeare's monument in Westminster Abbey.¹

I hope you will consider writing another popular book, this time explaining the methods of science. We need such an exposition for fighting the creationists.

I am sure you have spotted the error in the top line of p. 110. Pp. 172 and 173 need some proofreading before the next printing.

With best regards,



THOMAS H. JUKES

THJ/cf

¹ . . . the great globe itself
Yea, all which it inherit, shall dissolve,
And, like this insubstantial pageant faded,
Leave not a rack behind.